DEVELOPING INSTRUCTIONAL MODELS FOR THE TEACHING OF BIOLOGY, USING THE THEORY OF MULTIPLE INTELLIGENCES

The beauty of incorporating Howard Gardner's eight Intelligences into the classroom is that it allows for all children to learn through their strengths and to share their expertise. To be appreciated for the gifts they possess and to appreciate others for their gifts. This was a marvelous outcome of the incorporation of MI theory in the classroom. The camaraderie that developed among students and the appreciation and respect for each other's strengths were some of the most clear changes that could be noted.

When viewing the classroom through the framework of MI theory, teachers can better identify children's strengths and present instruction to students which incorporates the eight Intelligences into their lessons. Children are then afforded a variety of experiences which can be translated into greater learning outcomes.

MI theory is a way of thinking; it is an attitude about people which allows for similarities and differences. It allows for inclusion and enrichment, for self-esteem building and the development of respect for each individual and the gifts they bring to the classroom.

Whether it is a classroom environment or a world congress, each individual brings strengths to the situation; each individual brings gifts to share. When we listen and observe and show appreciation for these gifts we make a better 'whole', for truly, we are better together. We each bring a piece to the puzzle, a piece which adds color and beauty to the final product.

Significance of Multiple Intelligence Study

This study is significant because this will helps to realize that all students are not the same and that they could learn the same material by doing different assignments or using different instructional models rather than everyone doing the same thing or using the same instructional package in all classes. Teachers have always looked at student learning styles, but Multiple Intelligences are different. It is more how we think, than how we learn. If we find ways to identify the intelligences of our students, it will help them in building a repertoire of activities and assignments to suit the needs of all students in the class. It is important to note that it would be near impossible to come up with a paper and pencil test for each of the intelligences, because by doing that you are limiting that to students that have strong linguistic skills. At the end of this study I hope to be more aware of strengthens of my students and will use that in planning activities and assignments. It may require more work, but it will benefit the students in the long run.

Students could benefit from the results of the study. If students are aware of their intelligences it may assist them in being able to complete assignments more efficiently. They can learn techniques that stimulate their intelligence domain and hopefully find ways to connect the techniques across the curriculum.

Another significance of the study is that schools could use the information to see if further research could be conducted by implementing MI curriculums. The results of this study should not be the sole basis for starting an MI curriculum based education, but it could be used as a basis for looking into the possibility of it. Teachers in schools that decided that MI curriculum is not the best fit for them could still use some of the ideas in their day to day classroom activities.

Definition of Key Terms

Developing

Developing refers to, "to become bigger or organized, to expand, or enlarge, to grow larger, fuller, or complete". As used in the study, the word "developing " stands for "preparing and validating " Instructional Models for the teaching of Biology using the Theory of Multiple Intelligences at secondary level.

Instructional Models

The art and practice of imparting knowledge while transacting the curriculum require the skillful management of many methods and techniques. As intended in the study, the term refers to the combinations of techniques and skills that are needed for the effective transaction of curriculum to the learners.

Teaching of Biology

As used in the study, the term refers to the instructional programmes in Biology meant for standard VIII students using the syllabus prescribed by the General Education Department, Government of Kerala, using the text books developed by SCERT, Kerala. The scores obtained in Biology using the Instructional Models based on the theory of Multiple Intelligences (learning outcomes) is the dependent variable in the present study. The gain score differences, if any, can be attributed to due to the influence of the treatment variable.

Theory of Multiple Intelligences

Multiple intelligences are the eight different ways to demonstrate intellectual ability. It is how to learn best. It is a mental paradigm developed by Howard Gardner (1983) in which each individual's mind can be thought of at least eight relatively

autonomous intellectual capacities that individuals employ to approach problems and create products.

It identifies each student's intelligences has strong ramifications in the classroom. If a child's intelligence can be identified, then teachers can accommodate different children more successfully according to their orientation to learning. The following are the components of Multiple Intelligences, as propounded by Gardner.

a) Verbal/linguistic - children who demonstrate strength in the language arts: speaking, writing, reading & listening.

b) Mathematical / logical – children who display an aptitude for numbers, reasoning and problem solving.

c) Musical/ rhythmic - children who learn well through songs, patterns, rhythms, instruments and musical expression.

d) Visual/spatial - children who learn best visually and organizing things spatially. They like to see what you are talking about in order to understand.

e) Bodily/kinesthetic - children who experience learning best through activity: games, movement, hands-on tasks, building.

f) Interpersonal - children who are noticeably people oriented and outgoing, and do their learning cooperatively in groups or with a partner.

g) Intrapersonal - children who are especially in touch with their own feelings, values and ideas.

h) Naturalistic - children who love the outdoors, animals, field trips.

I) Existentialistic -children who learn in the context of where humankind stands in

the "big picture" of existence.

Hypotheses

The study was woven around the following hypotheses.

1. Biology achievement of secondary school students taught through Instructional Models based on Theory of Multiple Intelligences will be significantly higher than those taught through Activity Based Learning Method.
2. There will be significant difference in the Biology achievement of secondary school students when taught through Instructional Models based on the Theory of Multiple Intelligences with that of the existing Activity Based Learning Method based on
   a) gender
   b) locale of the school
   c) type of Management of schools
3. There is no significant difference in the achievement in Biology of secondary school students categorized as high, average and low, when taught through the developed Instructional Models based on the Theory of Multiple Intelligences on the different types of intelligences, such as,
   a) Verbal/linguistic
   b) Mathematical / logical
   c) Musical/ rhythmic
   d) Visual/spatial
   e) Bodily/kinesthetic

f) Interpersonal

g) Intrapersonal

h) Naturalistic,

with that of the existing Activity Based Learning Method.

Objectives

1. To develop Instructional Models for teaching Biology using the Theory of Multiple Intelligences at secondary level.
2. To compare the effectiveness of Instructional Models based on the Theory of Multiple Intelligences over Activity Based Learning Method on achievement in Biology at secondary level.
3. To compare the effectiveness of Instructional Models based on the Theory of Multiple Intelligences over Activity Based Learning Method for the subsamples based on

   a) gender

   b) locale of the school

   c) type of Management of schools
4. To compare the effectiveness of the developed Instructional Models based on the theory of Multiple Intelligences on the achievement in Biology of secondary school students on the different types of intelligences, such as,

   a) Verbal/linguistic

   b) Mathematical / logical

c) Musical/ rhythmic

d) Visual/spatial

e) Bodily/kinesthetic

f) Interpersonal

g) Intrapersonal

h) Naturalistic,

with that of the existing Activity Based Learning Method.

Methodology

The main focus of the present investigation was to develop instructional models for the teaching of biology using the theory of multiple intelligences at secondary level. A better assessment of the effectiveness of this Instructional package was ascertained by selecting a two group equivalent group design.

Tools used in the Study

The following tools were employed for the collection of data for the present study. They are:

(i) Achievement Test in Biology based on previous lessons. (Pre requisite Test) (Suresh & Arun Kumar, 2011)

(ii) Lesson transcripts in Biology based on the Theory of Multiple Intelligences. (Suresh & Arun Kumar, 2011)

(iii) Teaching Manual for Activity Based Learning. (Suresh & Arun Kumar, 2011)

(iv) Multiple Intelligences Scale for Secondary School Students (MISSS). (Suresh & Arun Kumar, 2011)

(v) Achievement Test in Biology.(Suresh & Arun Kumar, 2011)

Sample Selected

The population of the study consisted of secondary school students of Kerala following the State syllabus. The researcher adopted simple random sampling technique for sample selection. Ten divisions of Standard VIII students of five schools from four districts of Kerala were selected for the study. Govt. Higher Secondary School, Edneer, Kasaragod Dt., Govt. Higher Secondary School, Pallikunnu, Kannur Dt., Govt. High School, Chenad, Wayanad Dt., Govt. Higher Secondary School, Koduvally, Kannur Dt., JDT Islam Higher Secondary School, Marikunnu, Kozhikode Dt., were the selected schools. Among the ten divisions selected, each one from all the five schools were randomly selected as experimental groups and the other five as control groups. The total final sample consisted of 174 students from experimental groups and 181 students from control groups.

Major Findings

1) The Instructional Models for teaching Biology using the Theory of Multiple Intelligences at secondary level developed by the investigator was found to be more effective than Activity Based Learning Method when compared for the whole sample and the relevant subsamples taken for the study and also on the different types of intelligences such as,

   a) Verbal/linguistic

   b) Mathematical / logical

c) Musical/ rhythmic

d) Visual/spatial

e) Bodily/kinesthetic

f) Interpersonal

g) Intrapersonal

h) Naturalistic

2) There existed no gender difference in Biology Achievement when taught through Instructional model using the Theory of MI and that of Activity based Learning Method.

3) There existed no significant difference between and among the three groups of students (belonging to the category of bilingual, tribal and normal schools) with respect to their achievement in Biology when taught through Activity Based Learning Method.

4) There existed significant difference between and among the three groups of students (belonging to the category of bilingual, tribal and normal schools) with respect to achievement in Biology when taught through Instructional Models using the Theory of Multiple Intelligences and also on the different types of intelligences such as,

a) Verbal/linguistic

b) Mathematical / logical

c) Musical/ rhythmic

d) Visual/spatial

e) Bodily/kinesthetic

f) Interpersonal

g) Intrapersonal

h) Naturalistic,

5) There existed significant difference in the Biology achievement of students belonging to Bilingual-Normal and Normal - Tribal pairs of students are compared when taught through the Instructional models based on the Theory of MI.

6) There existed no significant difference in the achievement in Biology of students belonging to Bilingual and Tribal category when taught through Instructional Models for teaching Biology using the Theory of Multiple Intelligences (at 0.01 level).

7) There existed significant difference in the achievement in Biology of students belonging to Normal and Tribal category when taught through Activity Based Learning Method at secondary level (at 0.05 level).

8) There existed no significant difference in the achievement in Biology of students belonging to Bilingual-Normal and Bilingual-Tribal category when taught through Activity Based Learning Method at secondary level.